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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/578,405

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Joseph J. Barchi JR.

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VENABLE LLP

P.O. BOX 34385

WASHINGTON, DC 20043-9998

EXAMINER

HAQ, SHAFIQU

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/578,405	Applicant(s) BARCHI ET AL.	
	Examiner SHAFIQL HAQ	Art Unit 1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 21-29 is/are pending in the application.
- 4a) Of the above claim(s) 1-16 and 23-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-19 and 21-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>11/21/06</u> . | 6) <input type="checkbox"/> Other: _____ |

Response to Election-Restriction

1. Applicants' election with traverse of Group VI, claims 17-22 filed May 26, 2009 in response to Office Action of April 23, 2009 is acknowledged and entered.

The traversal is on the ground that claims of Groups I-V (claims 1-16) all include the common special technical feature of "the biofunctional group comprising a saccharide or the mercaptoalkanoic acid linked to the surface of the nanocrystalline core without a shell layer", which Chan *et al* does not present and therefore, the claims of Groups I-V possess unity of invention. Applicant argued that the claims of Group VI (claims 17-22) represent a process specially adapted for the manufacture of the product represented by the claims of Group I. Applicants further argued that the claims of Groups VII-IX (claims 23-29) represent methods of use of the product represented by the claims of Group I. For example, the method of imaging represented by claim 23 of Group VII, the method of medical imaging of claim 26 of Group VIII, and the method of therapy of claim 27 of Group IX each use the biofunctionalized quantum dot of claim 1. Therefore, all the claims of Groups I-IX possess unity of invention.

Applicants' arguments have been fully considered but are not persuasive because the common special technical feature "the biofunctional group comprising a saccharide" is obvious over the reference of Chan *et al* (see fig.1). As claimed, mercaptoalkanoic acid linked to the surface of the nanocryltalline core without a shell layer" may not be present in the

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biofunctionalized quantum dot because the recitation is articulated in alternate form. That is the recitation “or the mercaptoalkanoic acid is linked to the surface of the nanocrystalline core without a shell layer” indicates that the other alternate i.e. “biofunctional group compris[ing] a saccharide” is sufficient to provide the claimed biofunctional quantum dot. Chan *et al* disclose quantum dot comprising mercaptoalkanoic acid linked to the surface and a biofunctional group linked to the surface. Chan *et al* teach coupling of various biomolecules (lines 3-6 on first column of page 2017) and thus substitution of one biomolecules for another (e.g. substitution of protein with carbohydrate or biomolecules comprising carbohydrates), with the expectation of detection of various analytes as desired, would be obvious to one of ordinary skill in the art and therefore, the special technical feature (i.e. biofunctional group comprising a saccharide) which links claims of Groups I-IX, does not provide a contribution over the prior art. Therefore, inventions of group I-IX are not so linked as to form a single general inventive concept and the lack of unity requirement is proper and is made **FINAL**.

Accordingly, claims 1-16 and 23-29 are withdrawn from further consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

2. Claims 17-19 and 21-22 are examined on merits in this office action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 17-19 and 21-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. With regard to claim 17, it is unclear what groups applicants are intended to encompass by "hydrogen-alkali" in the compound of "hydrogen-alkali-group VIA element" because compounds encompassed by "hydrogen-alkali" is not clearly defined in the specification.
6. With regard to claim 17, the alternative embodiment as recited "wherein the biofunctional group comprises a saccharide or the mercaptoalkanoic acid is linked to a surface of a nanocrystalline core of the quantum dot without a shell layer" is confusing as well as vague and indefinite. It is unclear whether the same method process provides one of the alternative form of the biofunctional quantum dots or the method process provides a mixture of biofunctional quantum dots comprising 1) biofunctional quantum dots having a shell layer wherein biofunctional group comprises saccharide and 2) biofunctional quantum dots not having a shell layer wherein the biofunctional group does not comprise a saccharide but having mercaptoalkanoic acid linked to surface of nanocrystalline core of the quantum dot without the shell layer. Note that "or" indicates requirement of either one of the alternative form, that is when bifunctional group comprises a saccharide, the mercaptoalkanoic acid linked to a surface of a nanocrystalline core of quantum dot without a shell layer is

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not required (i.e. not the claimed biofunctional quantum dot). On the other hand, when the biofunctional quantum dot comprises mercaptoalkanoic acid linked to a surface of a nanocrystalline core of the quantum dot without a shell layer, the biofunctional group comprising a saccharide is not required. Further, the claimed method steps are unclear how the method steps as claimed provides one or both the alternative embodiments of the claimed biofunctionalized quantum dot.

7. Claim 1 recites "wherein the biofunctional group comprises a saccharide or the mercaptoalkanoic acid is linked to a surface of a nanocrystalline core of the quantum dot without a shell layer", but however the claim does not provide any method step(s) how mercaptoalkanoid acid is linked to a surface of a nanocrystal core of the quantum dot without a shell layer.
8. With regard to claim 19, it is unclear what catalysts are encompassed by the term "catalyst" in the claim that produce a thioester of Formula II, because compounds encompassed by "catalyst" for producing thioester of Formula II have not been clearly defined or described in the specification.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 17-19 and 21-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a

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way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The term "suitable solvent" as claimed in claim 17 is not clearly described in the specification. MPEP 2111.01 states that the words of a claim must be given their "plain meaning" unless they are defined in the specification. Therefore, the term "suitable solvent" can be any solvent that would be suitable to produce a quantum dot in a solution but however, all through the specification the only suitable solvents described to produce a quantum dot in solution is water or N, N-dimethylformamide" (see paragraphs [0025], [0027] and [0050]).

The MPEP states that the purpose of written description requirement is to ensure that the inventor had possession, as of the filing date of the application, of the specific subject matter later claimed. The MPEP lists factors that can be used to determine if sufficient evidence of possession has been furnished in the disclosure of the application. These include "level of skill and knowledge in the art, partial structure, physical and/or chemical properties, functional characteristics alone or coupled with a known or disclosed correlation between structure and function, and the method of making the claimed invention." See MPEP § 2163.

Specification does not clearly describe as to what would be the chemical structure, physical and chemical properties of compounds that would be considered as a solvent suitable for producing quantum dot having the

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desired properties as claimed. There is no guidance or example except for “water” and “N, N-dimethylformamide” as to what other compounds would fall under the definition of “suitable solvent” for producing quantum dot having the desired properties as claimed. Specification fails to provide adequate description for broad use of any solvent (except water or N, N-dimethylformamide) for producing quantum dot from a mixture comprising formula III, mercaptoalkanoic acid, cadmium salt and hydrogen-alkali-group VIA compounds. Structural, chemical and physical characteristic of compounds for “suitable solvent” have not been described in such a way that one of ordinary skill in the art would easily consider a compound without undue experimentation as a solvent suitable for producing the claimed quantum dot.

Accordingly, it is deemed that the specification fails to provide adequate written description and guidance for “suitable solvent” that would be useful for generating the quantum dot as claimed in claim 17 with the desired properties such as “mercaptoalkanoic acid linked to a surface of nanocrystalline core of the quantum dot without a shell layer”.

Further, an artisan in the art would not be able to practice the invention because an undue experimentation will be required to judge suitability of different “solvent” from structurally divergent solvents that would be encompassed by the term “solvent” in order to provide quantum dot in solution having the desired properties as claimed. Therefore, the instant specification fails to provide sufficient information about the composition and

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structure of the compounds encompassed by the term "suitable solvent" that would allow the skilled artisan to fully practice the instant invention without undue experimentation. Undue experimentation would be required to practice the invention as claimed due to the quantity of experimentation necessary; limited amount of guidance and limited number of working examples in the specification; nature of the invention; state of the prior art; relative skill level of those in the art; predictability or unpredictability in the art; and breadth of the claims. In re Wands, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

Therefore, the specification fails to provide sufficient support of the broad use of any "solvent". As a result, one of skill in the art would be forced to perform an exhaustive search for "solvent" from different solvents to find solvents suitable to provide quantum dot in a solution from the compounds (e.g. formula III, hydrogen-alkali-group VIA, mercaptoalkanoic acid) as claimed in claim 17. Genetech, 108 F.3d at 1366 states that "a patent is not a hunting license. It is not a reward for search, but compensation for its successful conclusion" and "[p]atent protection is granted in return for an enabling disclosure of an invention, not for vague intimations of general ideas that may or may not be workable."

Claim Rejections - 35 USC § 101

11.35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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12. Claims 17-19 and 21-22 are rejected under 35 U.S.C. 101 because the claimed recitation of “wherein ----- the mercaptoalkanoic acid is linked to a surface of a nanocrystalline core of the quantum dot without a shell layer”, without setting forth any active steps involved in the process of providing mercaptoalkanoic acid linked to a surface of a nanocrystalline core of the quantum dot without a shell layer, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Conclusion

13. No claims are allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shafiqul Haq whose telephone number is 571-272-6103. The examiner can normally be reached on 7:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark L. Shibuya can be reached on 571-272-0806. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Shafiqul Haq/
Primary Examiner, Art Unit 1641